Intelligent Customer Help Desk with Smart Document Understanding

A project report submitted for

Internship at smartinternz@2020

Category : Artificial Intelligence

By

Juliet Maria J
(julietmariajohn@gmai.com)

INDEX

1. INTRODUCTION

1.1 OVERVIEW

The main objective of the project is to create an Intelligent Customer Help Desk with smart document understanding by using multiple Watson AI Services (Discovery ,Assistant, Cloud function and Node Red). This project will help us learn best practices of combining Watson services and how they can build interactive information retrieval system.

Project Requirements:

1. **Functional Requirements :** IBM Cloud and services(Watson Assistant, Watson Discovery, Cloud Function,Node-Red).

2. **Technical Requirements :** Artificial Intelligence.

3. **Software Requirements :** Any operating system, Web browser.

4. **Project duration :** 30 days.

5. **Project team :** Juliet Maria(Individual)

1.2 PURPOSE

The typical customer care chatbot can answer simple questions, such as store locations and hours, directions, and maybe even making appointments. When a question falls outside of the scope of the pre-determined question set, the option is typically to tell the customer the question isn’t valid or offer to speak to a real person. The purpose of this project is to build a customer helping chatbot such that if the customer question is about the operation of a device, the application shall pass the question onto Watson Discovery Service, which has been pre-loaded with the device’s owners manual. So now, instead of “Would you like to speak to a customer representative?” or "Can you rephrase your query?" or "I couldn't understand could you ask something else?" we can return relevant sections of the owners manual to help solve our customers’ problems.

1.2.1 Scope of Work

1. Create a customer care dialog skill in Watson Assistant
2. Use Smart Document Understanding to build an enhanced Watson Discovery collection
3. Create an IBM Cloud Functions web action that allows Watson Assistant to post
4. queries to Watson Discovery
5. Build a web application with integration to all these services & deploy the same on IBM Cloud Platform

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

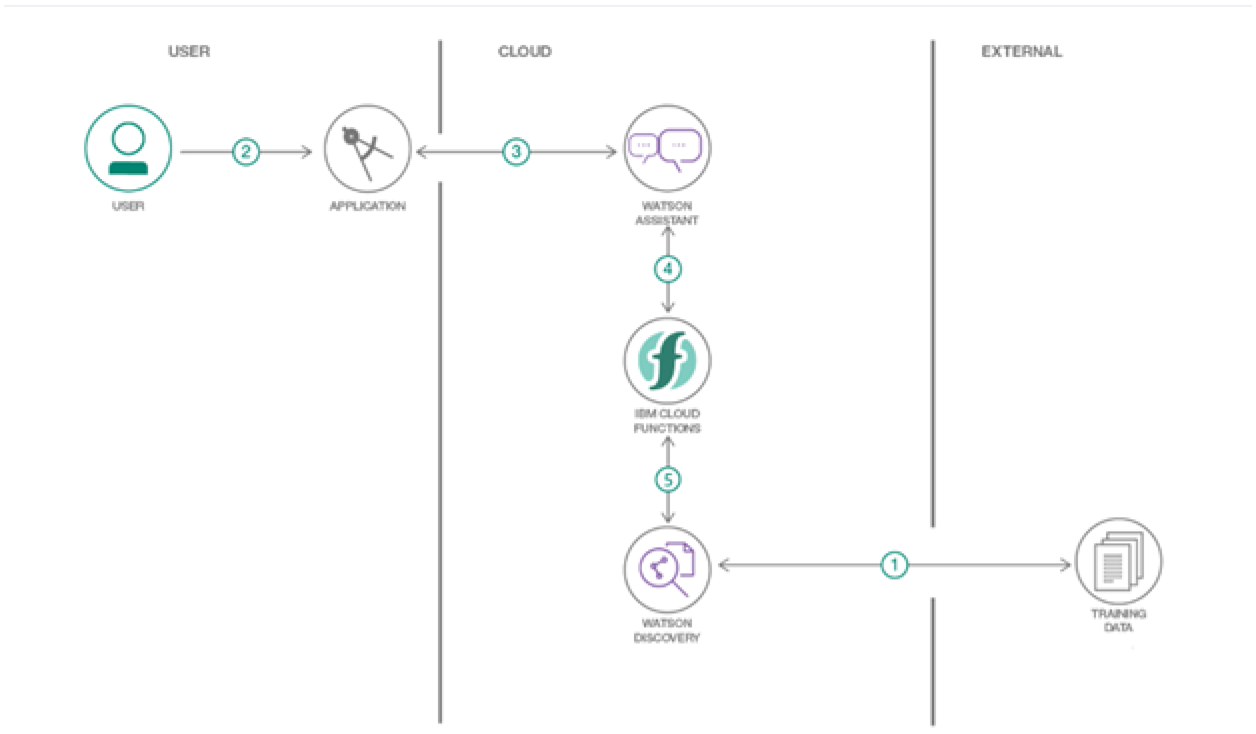
Usually Chatbots used for getting input from users and getting only response questions and for some questions the output from bot will be like “try again”, “I don’t understand”, “will you repeat again”, and so on. and directs customer to customer agent but a good customer Chatbot should minimize involvement of customer agent to chat with customer to clarify his/her doubts.

2.2 PROPOSED SOLUTION

For the above problem to get solved we have to put an virtual agent in chatbot so it can understand the queries that are posted by customers. The virtual agent should be trained from some insight records based company background so it can answer queries based on the product or related to company.In other words, some style of manual will be accustomed to train the bot using AI. In this project I used Watson Discovery tool for implementing AI and getting trained by the owners manual of heater to achieve the above solution. And later including Assistant and Discovery on Node-RED.

3. THEORETICAL ANALYSIS

3.1 BLOCK DIAGRAM



1.The document is annotated using Watson Discovery SDU.

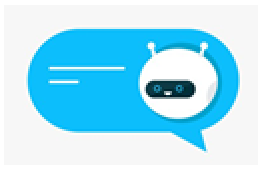
2.The user interacts with the backend server via the app UI. The frontend app UI is a chatbot that engages the user in a conversation.

3.Dialog between the user and backend server is coordinated using a Watson Assistant dialog skill.

4.If the user asks a product operation question, a search query is passed to a predefined IBM Cloud Functions action.

5.The Cloud Functions action will query the Watson Discovery service and return the results.

3.2 HARDWARE / SOFTWARE DESIGN



1. Create IBM Cloud services
2. Configure Watson Discovery
3. Create IBM Cloud Functions action
4. Configure Watson Assistant
5. Create flow and configure node
6. Deploy and run Node Red app.

4 .EXPERIMENTAL INVESTIGATIONS

4.1.CREATE IBM CLOUD SERVICES

Create the following services:

● Watson Discovery

● Watson Assistant

● Cloud Function

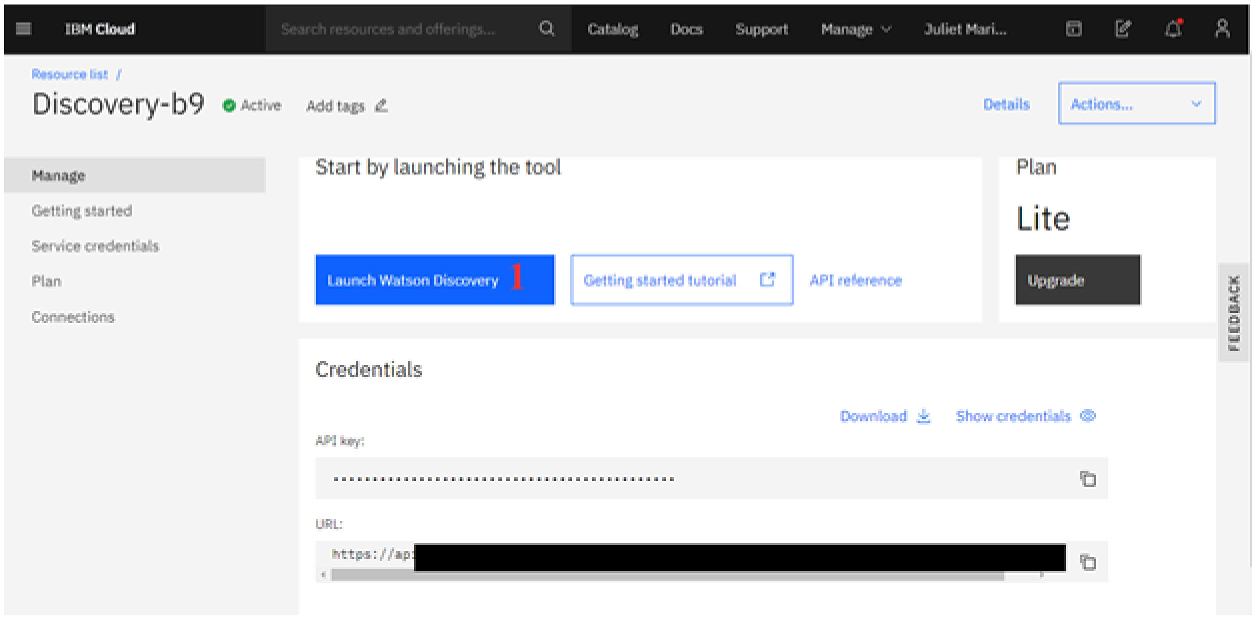
● Node Red

Configure Watson Discovery

After creating and launching the discovery from the Catalog, Import the document on which on which we need to train the discovery service. We have selected the ecobee3 user guide located in the data directory of our local repository. The Ecobee3 is a popular residential thermostat that has a WIFI interface and multiple configuration options. The result of the queries performed without configuring the data present in the document won't be that accurate. But the results improve significantly after applying SDU (Smart Document Understanding). This can be done easily by clicking on the configure setting and then labelling each word or element present in the document as their respective label such as title, subtitle, text, image and Footer. Some of the labels are not present in the lite plan. In the lite plan we are provided with limited content of IBM Watson, the labels help us in segmentation of the document which helps the discovery to understand the document better and provide better results. The results provided by the discovery can be improved, all the results are shown in assistant in which the discovery finds the sentiment to be positive i.e. matching between the question or query entered by the user and the data of the document. Better the sentiment analysis accurate the results are.

To configure the watson discovery the below steps are followed:

• After creating the discovery from the catalog, we will be redirected to this base page of discovery where the name of the discovery along with its API Key and URL are mentioned. These credentials will be used in further steps.

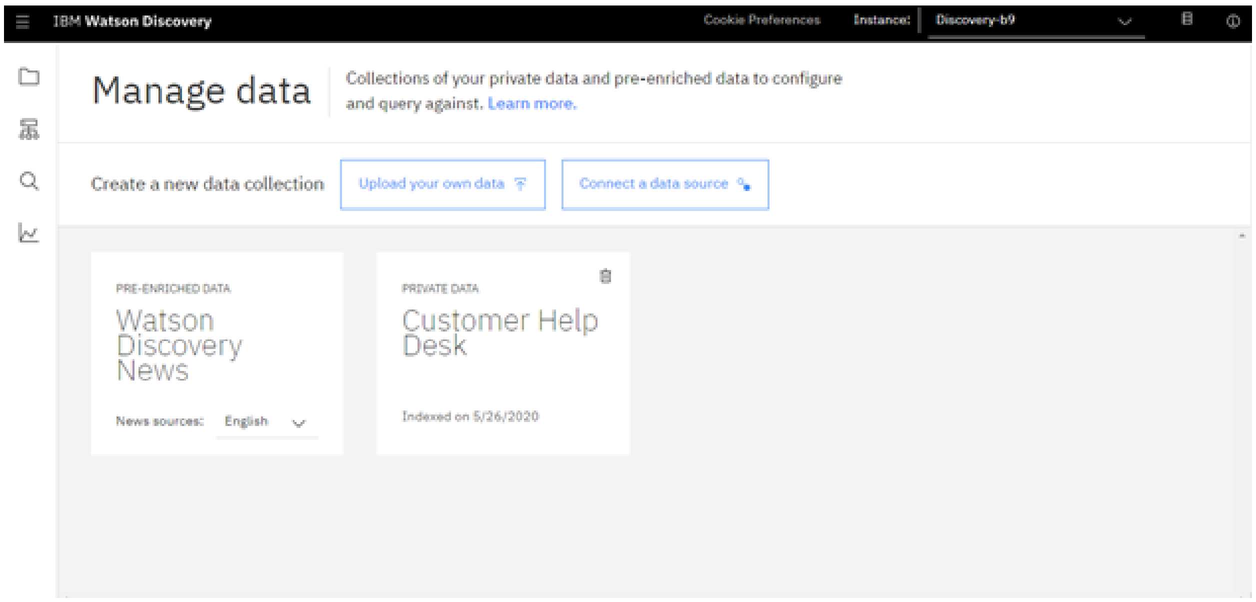


API key: ....

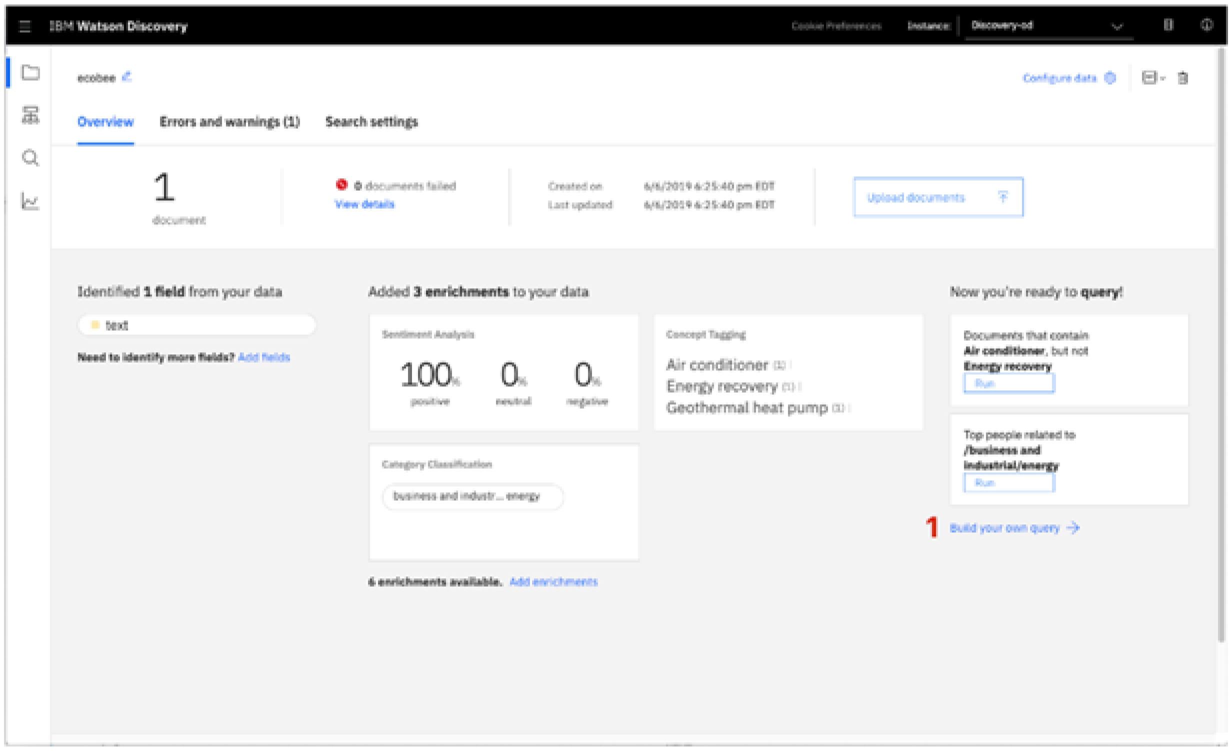
URL: https://ap[redacted]

Click on the Launch Watson Discovery [1] to launch the discovery.

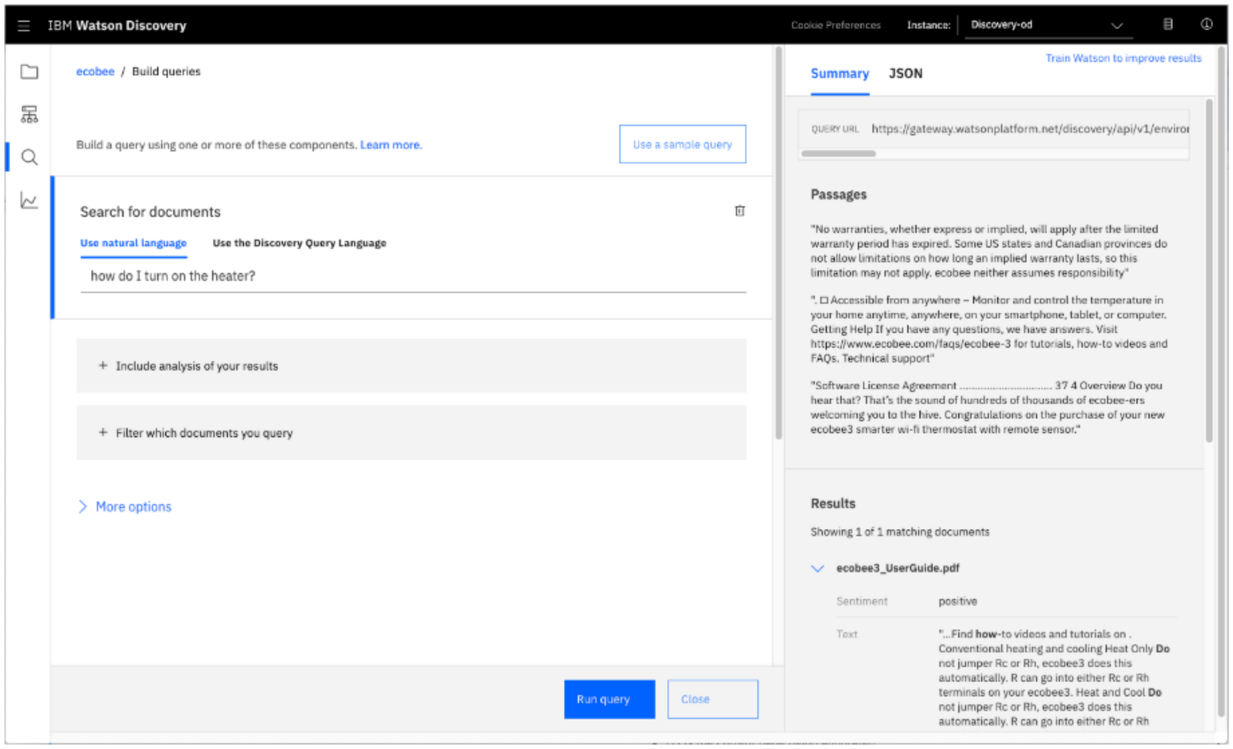
• Now in the next step, we have to upload the data by clicking, upload your data. Here we have already uploaded the data as manual.



• After uploading the document we will see the page like this, we can ignore the warnings section as it is due to the normalization process and is of no worry. Now click on the build your own query [1] , so that we can have an idea how the results have significantly improved after configuring the data.


IBM Watson Discovery
Cookie Preferences
Instance: Discovery-od
ecobee
Configure data
Overview
Errors and warnings (1)
Search settings
1
document
0 documents failed
View details
Created on 6/6/2019 6:25:40 pm EDT
Last updated 6/6/2019 6:25:40 pm EDT
Upload documents
Identified 1 field from your data
text
Need to identify more fields? Add fields
Added 3 enrichments to your data
Sentiment Analysis
100% positive
0% neutral
0% negative
Concept Tagging
Air conditioner (1)
Energy recovery (1)
Geothermal heat pump (1)
Category Classification
business and industr... energy
6 enrichments available. Add enrichments
Now you're ready to query!
Documents that contain Air conditioner, but not Energy recovery
Run
Top people related to /business and industrial/energy
Run
1
Build your own query

• Enter the queries related to thermostat and view the results. As you will see, the results are not very useful and not even that relevant. The next step is to annotate the document with SDU.



Build a query using one or more of these components. Learn more.

Search for documents

Use natural language | Use the Discovery Query Language

how do I turn on the heater?

+ Include analysis of your results

+ Filter which documents you query

> More options

QUERY URL https://gateway.watsonplatform.net/discovery/api/v1/enviror

Passages

"No warranties, whether express or implied, will apply after the limited warranty period has expired. Some US states and Canadian provinces do not allow limitations on how long an implied warranty lasts, so this limitation may not apply. ecobee neither assumes responsibility"

". ☐ Accessible from anywhere – Monitor and control the temperature in your home anytime, anywhere, on your smartphone, tablet, or computer. Getting Help If you have any questions, we have answers. Visit https://www.ecobee.com/faqs/ecobee-3 for tutorials, how-to videos and FAQs. Technical support"

"Software License Agreement .... 37 4 Overview Do you hear that? That's the sound of hundreds of thousands of ecobee-ers welcoming you to the hive. Congratulations on the purchase of your new ecobee3 smarter wi-fi thermostat with remote sensor."

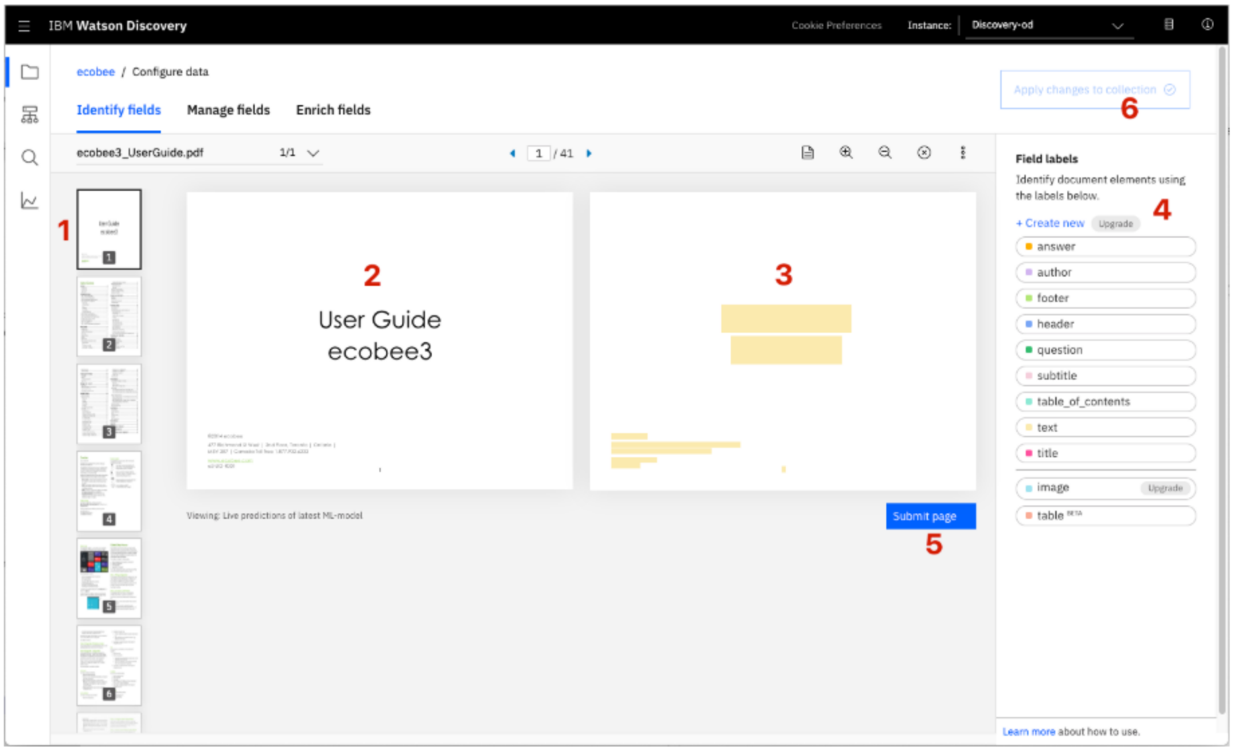
Results

Showing 1 of 1 matching documents

ecobee3_UserGuide.pdf

Sentiment	positive
Text	"...Find **how**-to videos and tutorials on . Conventional heating and cooling Heat Only **Do** not jumper Rc or Rh, ecobee3 does this automatically. R can go into either Rc or Rh terminals on your ecobee3. Heat and Cool **Do** not jumper Rc or Rh, ecobee3 does this automatically. R can go into either Rc or Rh

• Below is the layout of Identify fields tab of the SDU annotation panel:



The aim is to annotate all the pages of the document, so that discovery can learn what text is important and what text can be ignored.

- [1] is the list of pages we have in the document. In the lite plan we are unable to upload a document more than 50,000 words and any document with more than that will be trimmed to this range.
- [2] is the current page being annotated.
- [3] is the page in which we have to provide a label to each text, for example as shown above we have the Title and text, at the bottom we have the footer.
- [4] is the list of labels we can provide in which the image label is not available in the lite plan.
- We have to click the submit page button [5] after annotating each page individually, after few pages the discovery will automatically give the label to the remaining pages.
- Click [6] after completing the annotation of the document.

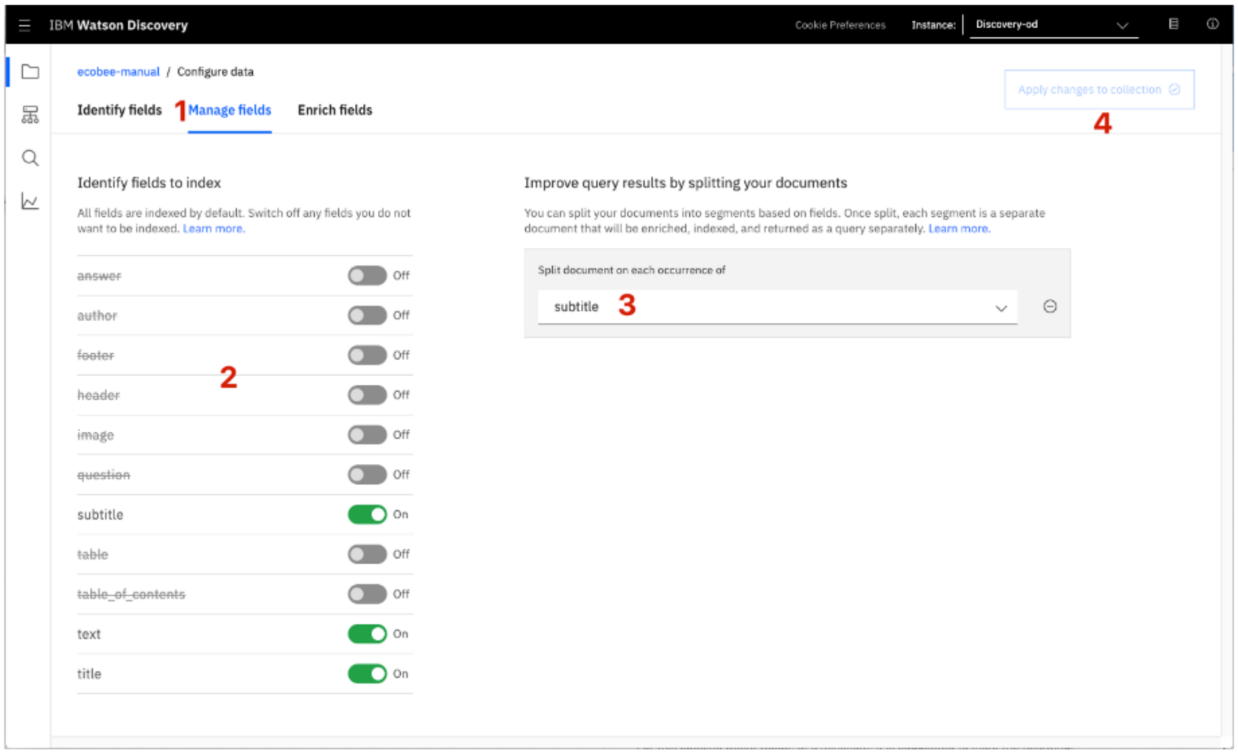
As we go though the annotations one page at a time, Discovery is learning and should start automatically updating the upcoming pages. Once we get to a page that is already correctly annotated, we can stop, or simply click Submit [5] to acknowledge it is correct. The more pages you annotate, the better the model will be trained.

For this specific owner's manual, at a minimum, it is suggested to mark the following:

- The main title page as title
- The table of contents (shown in the first few pages) as table_of_contents
- All headers and sub-headers (typed in light green text) as a subtitle

- All page numbers as footers
- All warranty and licensing infomation (located in the last few pages) as a footer
- All other text should be marked as text.

• For further segmentation and making the sub documents, we have to manage the fields. Here we are provided with the option of identifying field to index i.e. what all texts are important for us, as we can see in the below snip, we have turned on only subtitle and text because they are the only 2 labels in which we are interested. On the right side we have the option splitting the document as per choice of our label. We have selected subtitle here. This can vary as per different needs of user.



Identify fields to index

All fields are indexed by default. Switch off any fields you do not want to be indexed. Learn more.

~~answer~~	Off
author	Off
~~footer~~	Off
~~header~~	Off
~~image~~	Off
~~question~~	Off
subtitle	On
~~table~~	Off
~~table_of_contents~~	Off
text	On
title	On

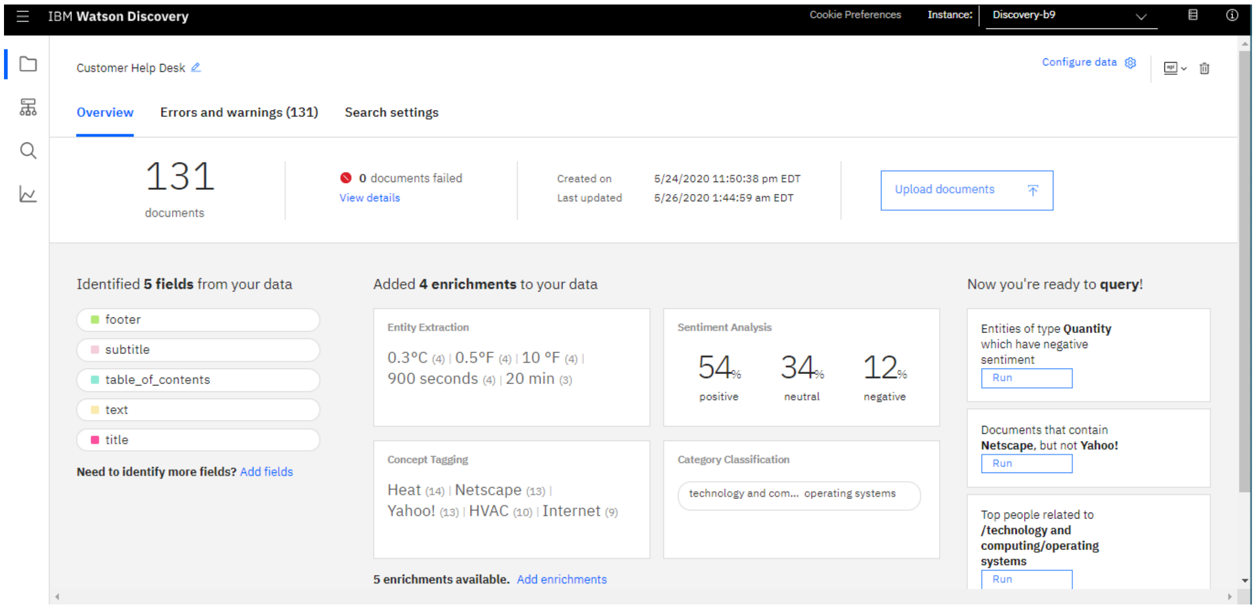
Improve query results by splitting your documents

You can split your documents into segments based on fields. Once split, each segment is a separate document that will be enriched, indexed, and returned as a query separately. Learn more.

Split document on each occurrence of: subtitle

Once we click the Apply changes to collection button [6], we will be asked to reload the document. Choose the same owner's manual .pdf document as before.

• It will take some time to process and after that we will have multiple documents as shown below, the document we uploaded earlier is segmented in 104 documents as shown below.



131 documents

0 documents failed
View details

Created on 5/24/2020 11:50:38 pm EDT
Last updated 5/26/2020 1:44:59 am EDT

Identified **5 fields** from your data

- footer
- subtitle
- table_of_contents
- text
- title

Need to identify more fields? Add fields

Added **4 enrichments** to your data

Entity Extraction
0.3°C (4) | 0.5°F (4) | 10 °F (4) | 900 seconds (4) | 20 min (3)

Sentiment Analysis
54% positive | 34% neutral | 12% negative

Concept Tagging
Heat (14) | Netscape (13) | Yahoo! (13) | HVAC (10) | Internet (9)

Category Classification
technology and com... operating systems

5 enrichments available. Add enrichments

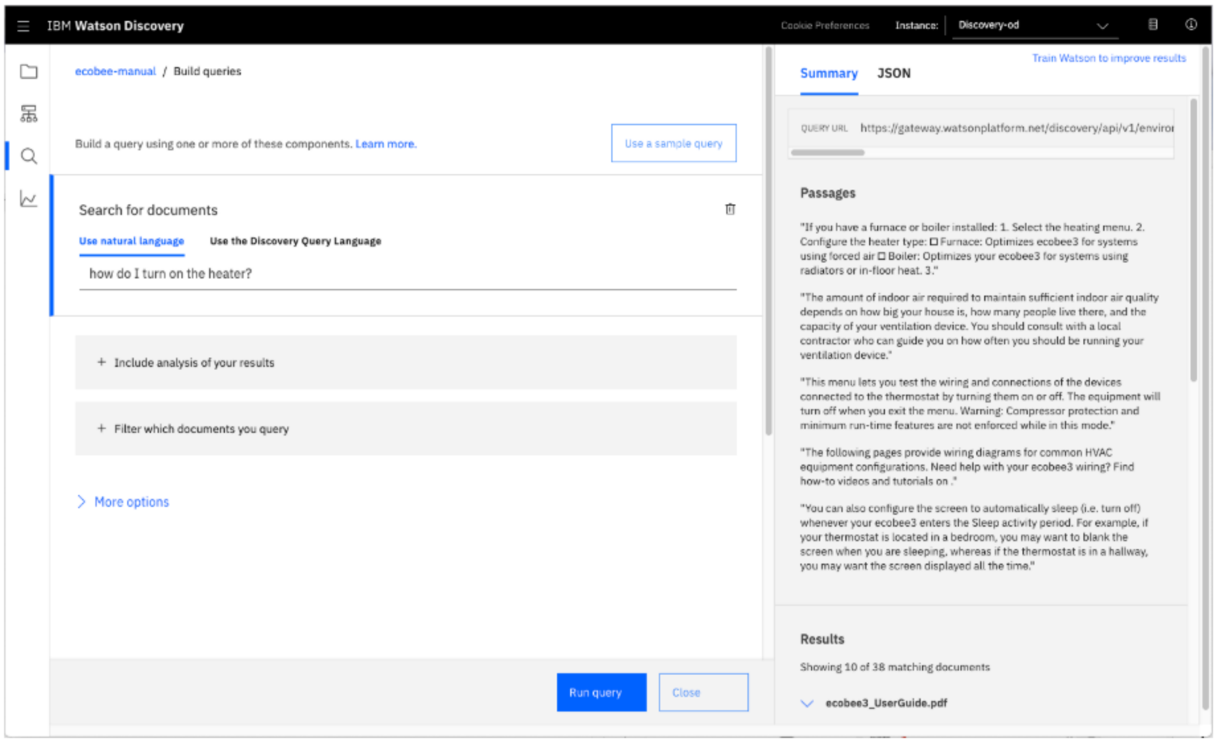
Now you're ready to **query!**

Entities of type **Quantity** which have negative sentiment
Run

Documents that contain **Netscape**, but not **Yahoo!**
Run

Top people related to **/technology and computing/operating systems**
Run

• Return to the query panel and try to build the same query as earlier and check the result. We will observe an improved result.


IBM Watson Discovery
Cookie Preferences
Instance:
Discovery-od
ecobee-manual / Build queries
Use a sample query
Search for documents
Use natural language
Use the Discovery Query Language
+ Include analysis of your results
+ Filter which documents you query
More options
Run query
Close
Summary
JSON
Train Watson to improve results

Build a query using one or more of these components. Learn more.

how do I turn on the heater?

QUERY URL https://gateway.watsonplatform.net/discovery/api/v1/enviror

Passages

"If you have a furnace or boiler installed: 1. Select the heating menu. 2. Configure the heater type: ☐ Furnace: Optimizes ecobee3 for systems using forced air ☐ Boiler: Optimizes your ecobee3 for systems using radiators or in-floor heat. 3."

"The amount of indoor air required to maintain sufficient indoor air quality depends on how big your house is, how many people live there, and the capacity of your ventilation device. You should consult with a local contractor who can guide you on how often you should be running your ventilation device."

"This menu lets you test the wiring and connections of the devices connected to the thermostat by turning them on or off. The equipment will turn off when you exit the menu. Warning: Compressor protection and minimum run-time features are not enforced while in this mode."

"The following pages provide wiring diagrams for common HVAC equipment configurations. Need help with your ecobee3 wiring? Find how-to videos and tutorials on ."

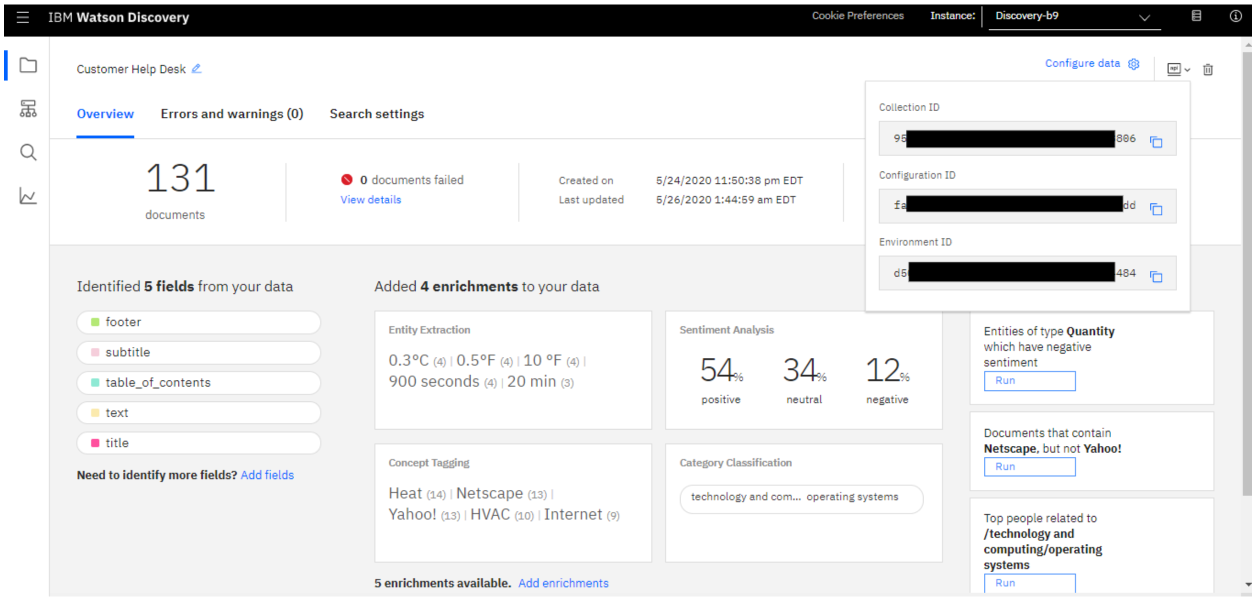
"You can also configure the screen to automatically sleep (i.e. turn off) whenever your ecobee3 enters the Sleep activity period. For example, if your thermostat is located in a bedroom, you may want to blank the screen when you are sleeping, whereas if the thermostat is in a hallway, you may want the screen displayed all the time."

Results

Showing 10 of 38 matching documents

ecobee3_UserGuide.pdf

• Next, we have to store the credentials of Discovery which can be viewed as shown below:



Instance: Discovery-b9

Customer Help Desk

131 documents

0 documents failed
View details

Created on 5/24/2020 11:50:38 pm EDT
Last updated 5/26/2020 1:44:59 am EDT

Collection ID
96[redacted]806

Configuration ID
fa[redacted]dd

Environment ID
d5[redacted]484

Identified **5 fields** from your data
- footer
- subtitle
- table_of_contents
- text
- title

Need to identify more fields? Add fields

Added **4 enrichments** to your data

Entity Extraction
0.3°C (4) | 0.5°F (4) | 10 °F (4) | 900 seconds (4) | 20 min (3)

Sentiment Analysis
54% positive 34% neutral 12% negative

Concept Tagging
Heat (14) | Netscape (13) | Yahoo! (13) | HVAC (10) | Internet (9)

Category Classification
technology and com... operating systems

5 enrichments available. Add enrichments

Entities of type **Quantity** which have negative sentiment

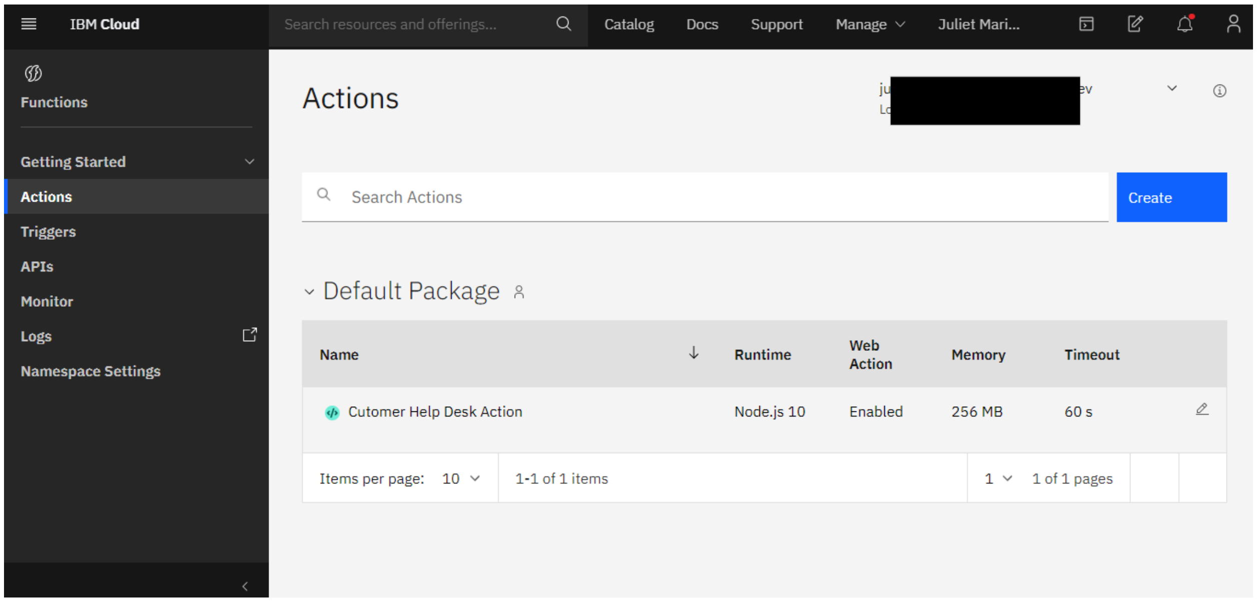
Documents that contain **Netscape**, but not **Yahoo!**

Top people related to **/technology and computing/operating systems**

• We already have the API key and the URL.

• Next, we have to create the IBM Cloud Function Action:

- It is used to link the discovery with assistant, so that our queries can be answered by the discovery.
- After selecting the action from the IBM catalog, we have to click on the action tab as shown on the left menu. Here we made the Information function. Then we can post the code which will help us to link the discovery.



Actions

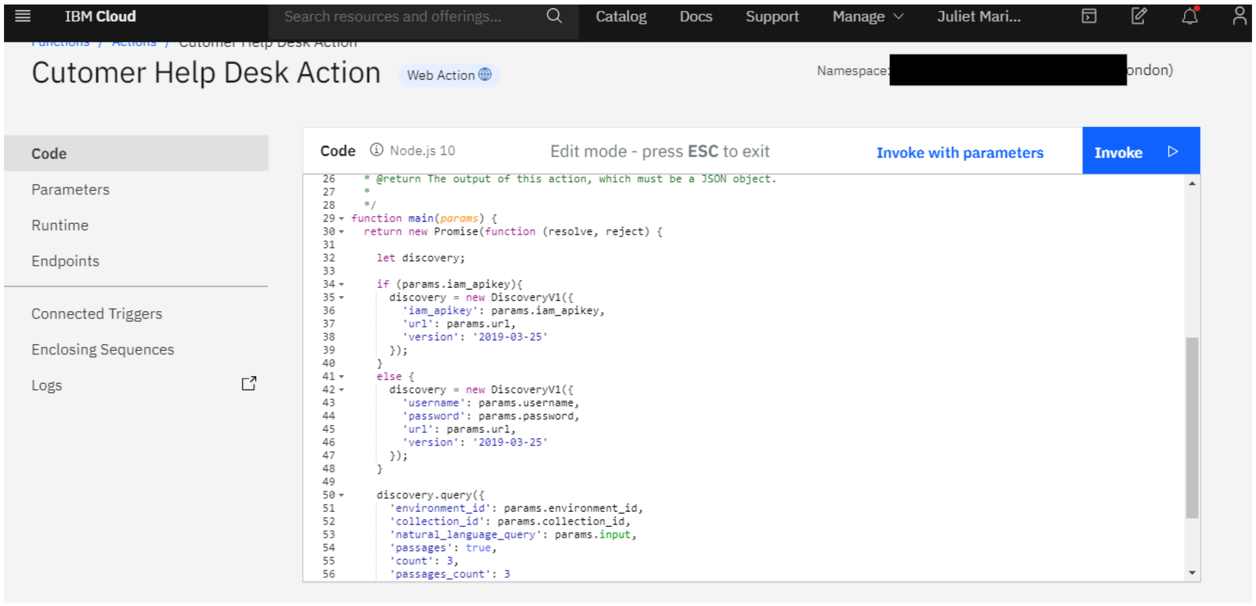
[redacted]

Search Actions | Create

Default Package

Name	Runtime	Web Action	Memory	Timeout
Cutomer Help Desk Action	Node.js 10	Enabled	256 MB	60 s

Items per page: 10 | 1-1 of 1 items | 1 | 1 of 1 pages



Cutomer Help Desk Action Web Action

Namespace: [redacted] ondon)

Code Node.js 10 Edit mode - press ESC to exit

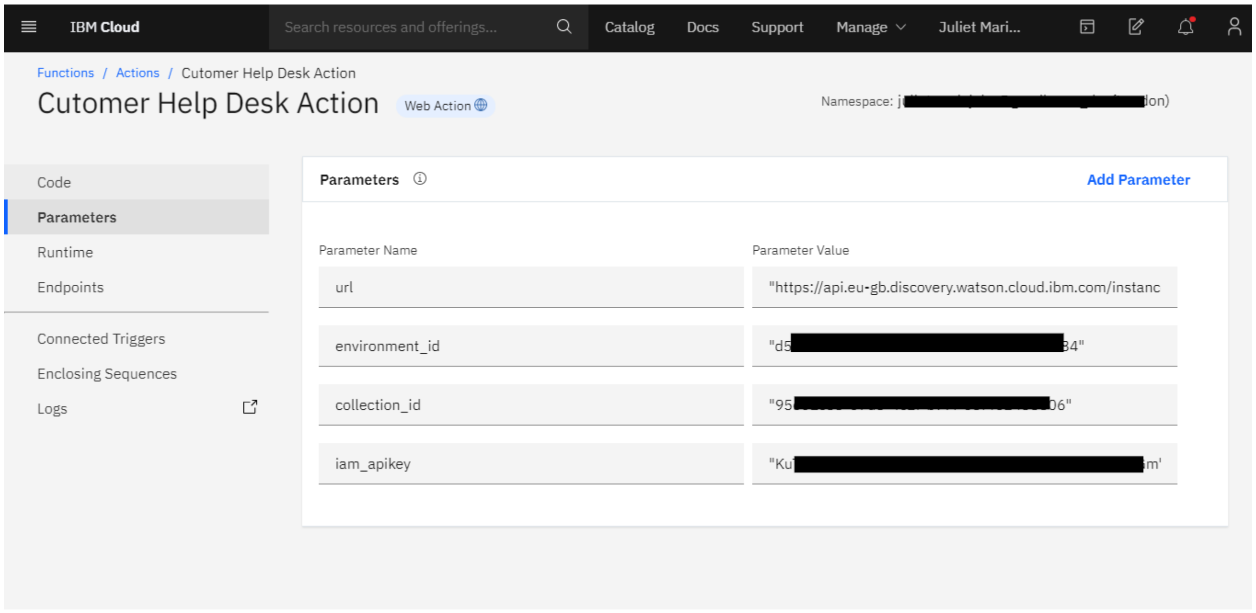
```
  * @return The output of this action, which must be a JSON object.
  *
  */
function main(params) {
  return new Promise(function (resolve, reject) {

    let discovery;

    if (params.iam_apikey){
      discovery = new DiscoveryV1({
        'iam_apikey': params.iam_apikey,
        'url': params.url,
        'version': '2019-03-25'
      });
    }
    else {
      discovery = new DiscoveryV1({
        'username': params.username,
        'password': params.password,
        'url': params.url,
        'version': '2019-03-25'
      });
    }

    discovery.query({
      'environment_id': params.environment_id,
      'collection_id': params.collection_id,
      'natural_language_query': params.input,
      'passages': true,
      'count': 3,
      'passages_count': 3
```

We can make the parameters as per the code and paste the parameter value from the discovery credentials. After that we have to click on the endpoint and enable the web action which will generate a public URL and it will be further used.



IBM Cloud | Catalog | Docs | Support | Manage | Juliet Mari...

Functions / Actions / Cutomer Help Desk Action

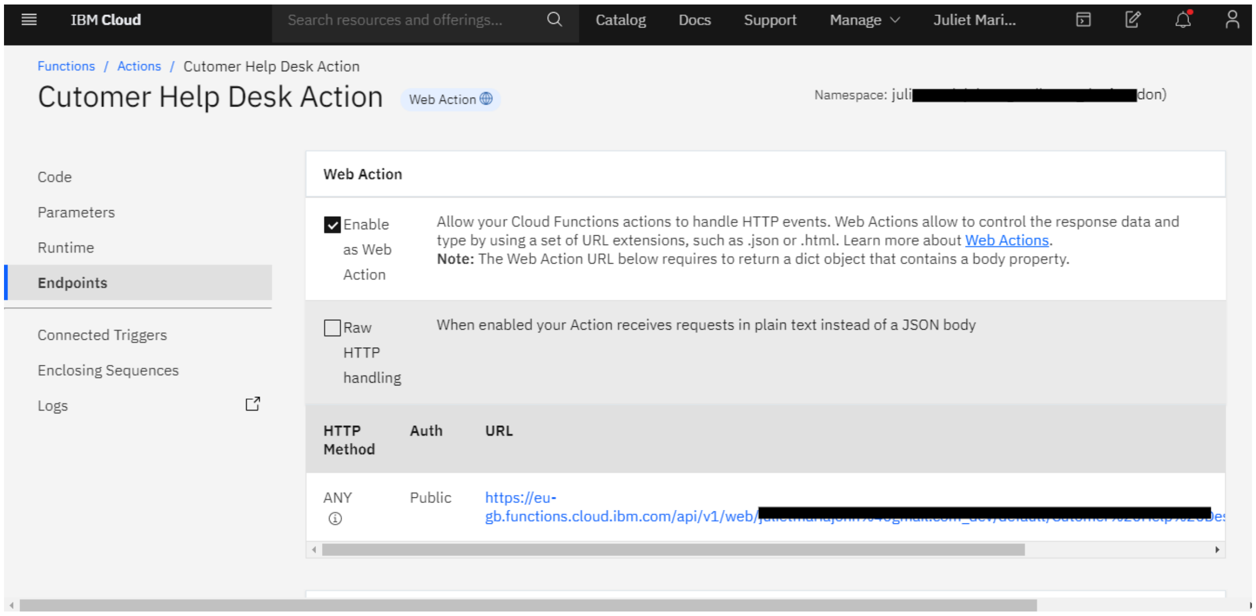
Cutomer Help Desk Action Web Action

Namespace: j[redacted]don)

Code
Parameters
Runtime
Endpoints
Connected Triggers
Enclosing Sequences
Logs

Parameters — Add Parameter

Parameter Name	Parameter Value
url	"https://api.eu-gb.discovery.watson.cloud.ibm.com/instanc
environment_id	"d5[redacted]34"
collection_id	"95[redacted]06"
iam_apikey	"Ku[redacted]m'



IBM Cloud | Catalog | Docs | Support | Manage | Juliet Mari...

Functions / Actions / Cutomer Help Desk Action

Cutomer Help Desk Action Web Action

Namespace: juli[redacted]don)

Code
Parameters
Runtime
Endpoints
Connected Triggers
Enclosing Sequences
Logs

Web Action

[✓] Enable as Web Action — Allow your Cloud Functions actions to handle HTTP events. Web Actions allow to control the response data and type by using a set of URL extensions, such as .json or .html. Learn more about Web Actions.
Note: The Web Action URL below requires to return a dict object that contains a body property.

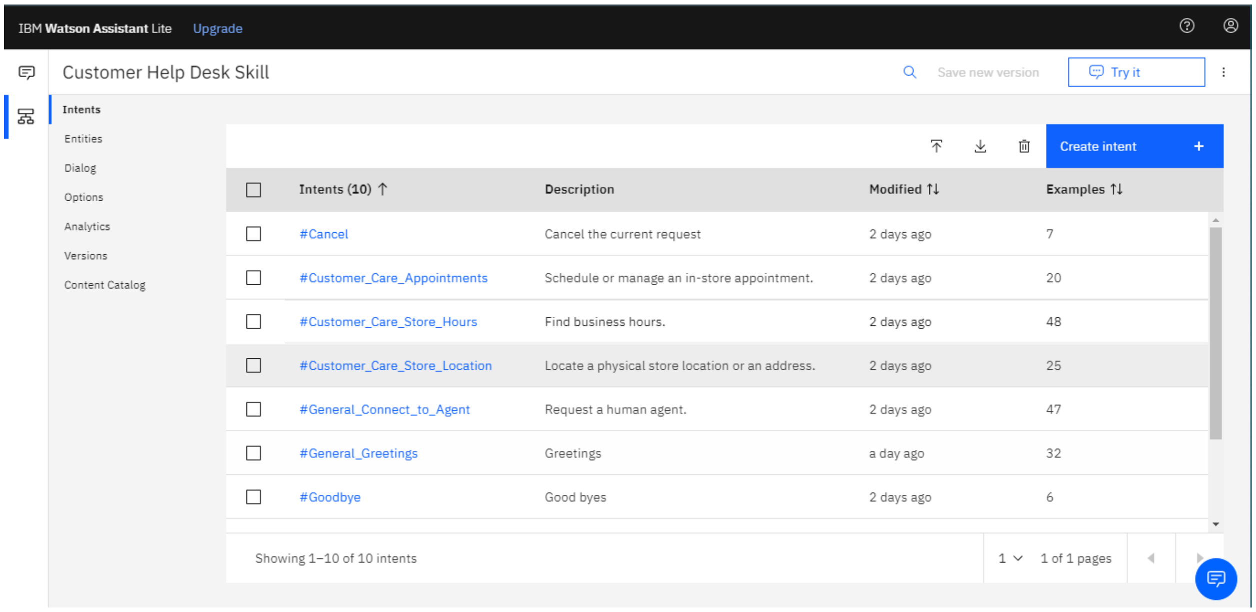
[ ] Raw HTTP handling — When enabled your Action receives requests in plain text instead of a JSON body

HTTP Method	Auth	URL
ANY	Public	https://eu-gb.functions.cloud.ibm.com/api/v1/web/[redacted]

• Next, we have to make the Watson assistant to use the sample customer care skill for convenience. We can add intent related to product information and the related entities and dialog flow.

- **Intents**- These are the categories which we mention or we expect the user input to be, for example: Greetings can be an intent and in it we can have examples as Good Morning, Good Evening and all.

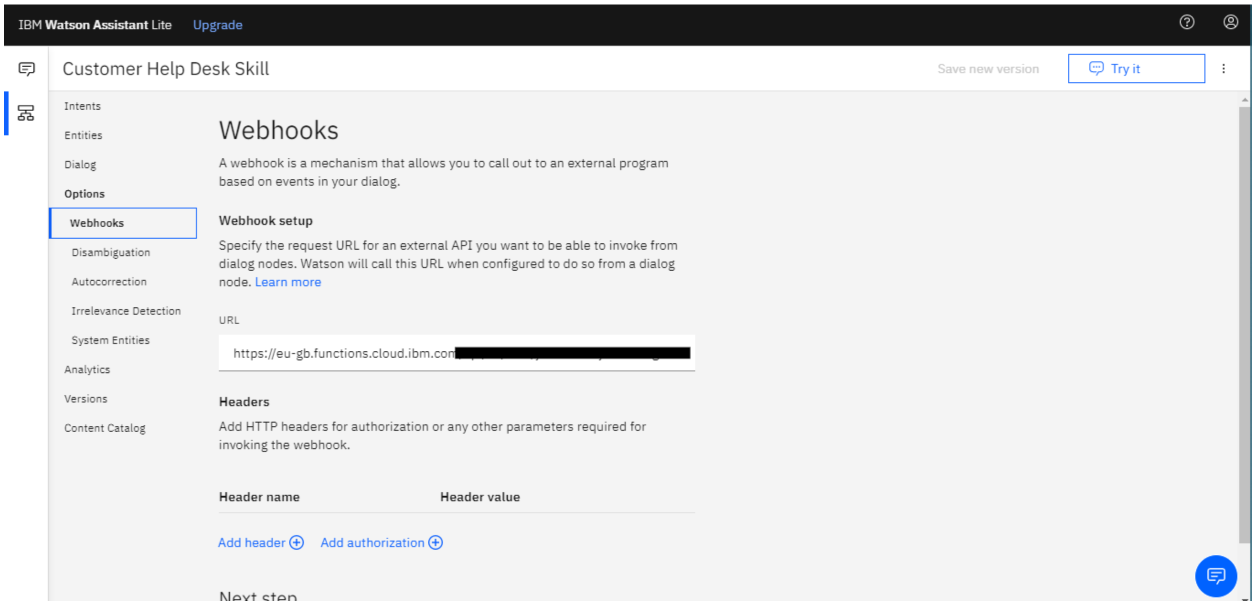
- **Entities**- These are used to mention the usual typos of the user and the synonyms like some people write the good morning as gm, good morning, gud morning, so we can cover all these also instead of returning a message to rephrase.
- **Dialog**- Here we mention the outputs to be given, these can be static as well as dynamic.



Intents (10) ↑	Description	Modified ⇅	Examples ⇅
#Cancel	Cancel the current request	2 days ago	7
#Customer_Care_Appointments	Schedule or manage an in-store appointment.	2 days ago	20
#Customer_Care_Store_Hours	Find business hours.	2 days ago	48
#Customer_Care_Store_Location	Locate a physical store location or an address.	2 days ago	25
#General_Connect_to_Agent	Request a human agent.	2 days ago	47
#General_Greetings	Greetings	a day ago	32
#Goodbye	Good byes	2 days ago	6

Showing 1–10 of 10 intents   1   1 of 1 pages

• Next, we have to mention the URL that we got earlier.



Webhooks

A webhook is a mechanism that allows you to call out to an external program based on events in your dialog.

Webhook setup

Specify the request URL for an external API you want to be able to invoke from dialog nodes. Watson will call this URL when configured to do so from a dialog node. Learn more

URL

https://eu-gb.functions.cloud.ibm.com[redacted]

Headers

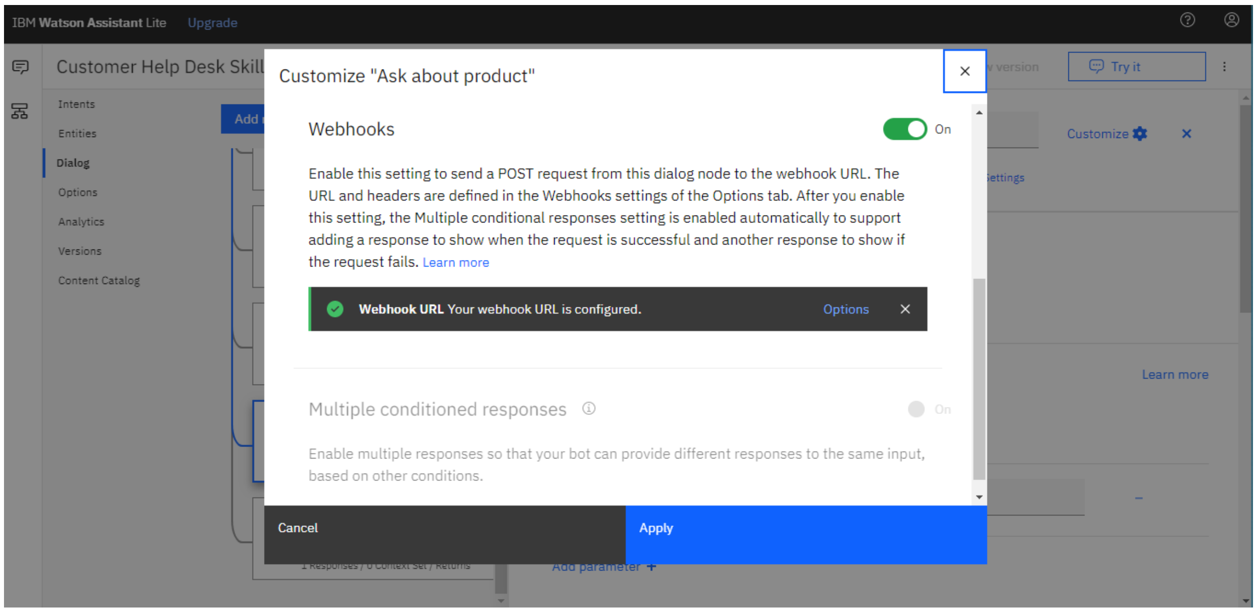
Add HTTP headers for authorization or any other parameters required for invoking the webhook.

Header name	Header value

Add header ⊕ Add authorization ⊕

Next step

We have to enable the webhooks which enables our dialog to send a POST request to the webhook URL.


Customize "Ask about product"

Webhooks — On

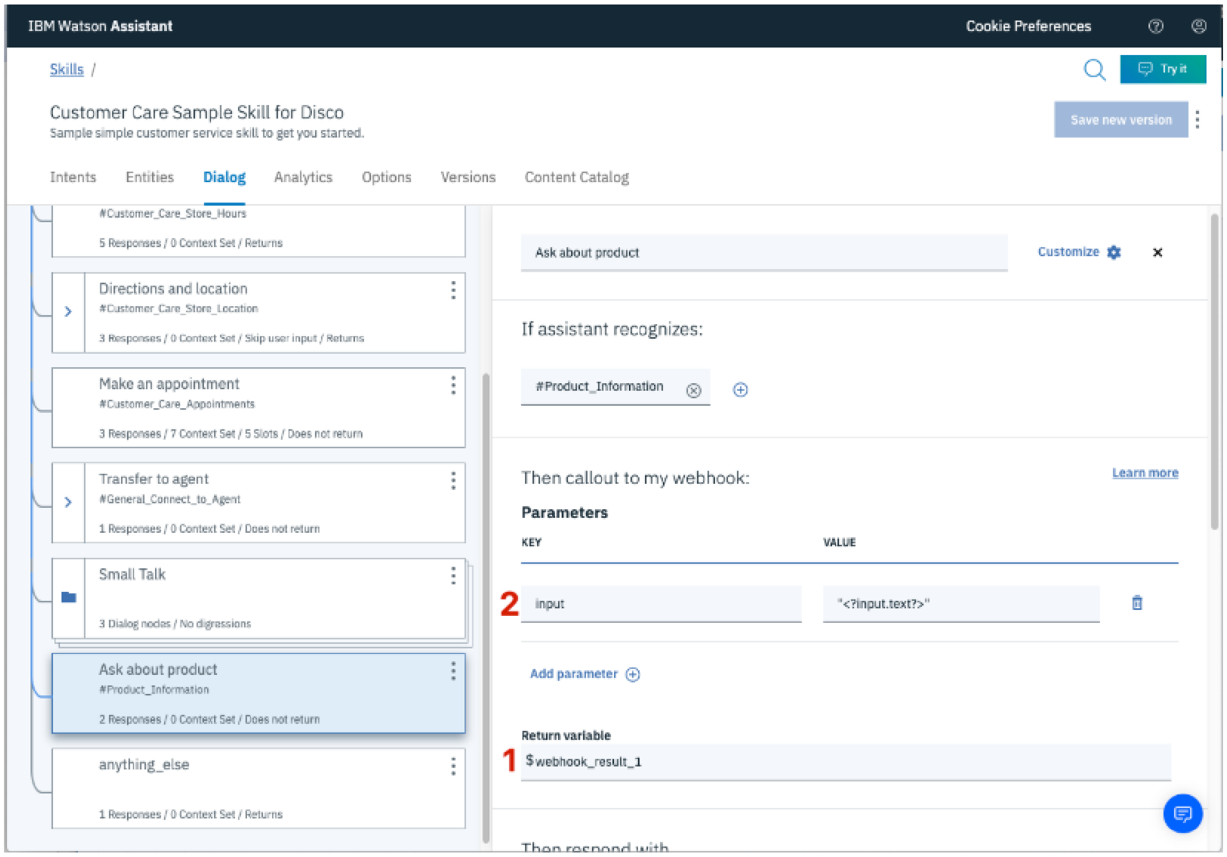
Enable this setting to send a POST request from this dialog node to the webhook URL. The URL and headers are defined in the Webhooks settings of the Options tab. After you enable this setting, the Multiple conditional responses setting is enabled automatically to support adding a response to show when the request is successful and another response to show if the request fails. Learn more

Webhook URL Your webhook URL is configured. Options

Multiple conditioned responses — On

Enable multiple responses so that your bot can provide different responses to the same input, based on other conditions.

The dialog node should have a Return variable [1] set automatically to $webhook_result_1. This is the variable name you can use to access the result from the Discovery service query.


Customer Care Sample Skill for Disco
Sample simple customer service skill to get you started.

Ask about product

If assistant recognizes: #Product_Information

Then callout to my webhook:

Parameters

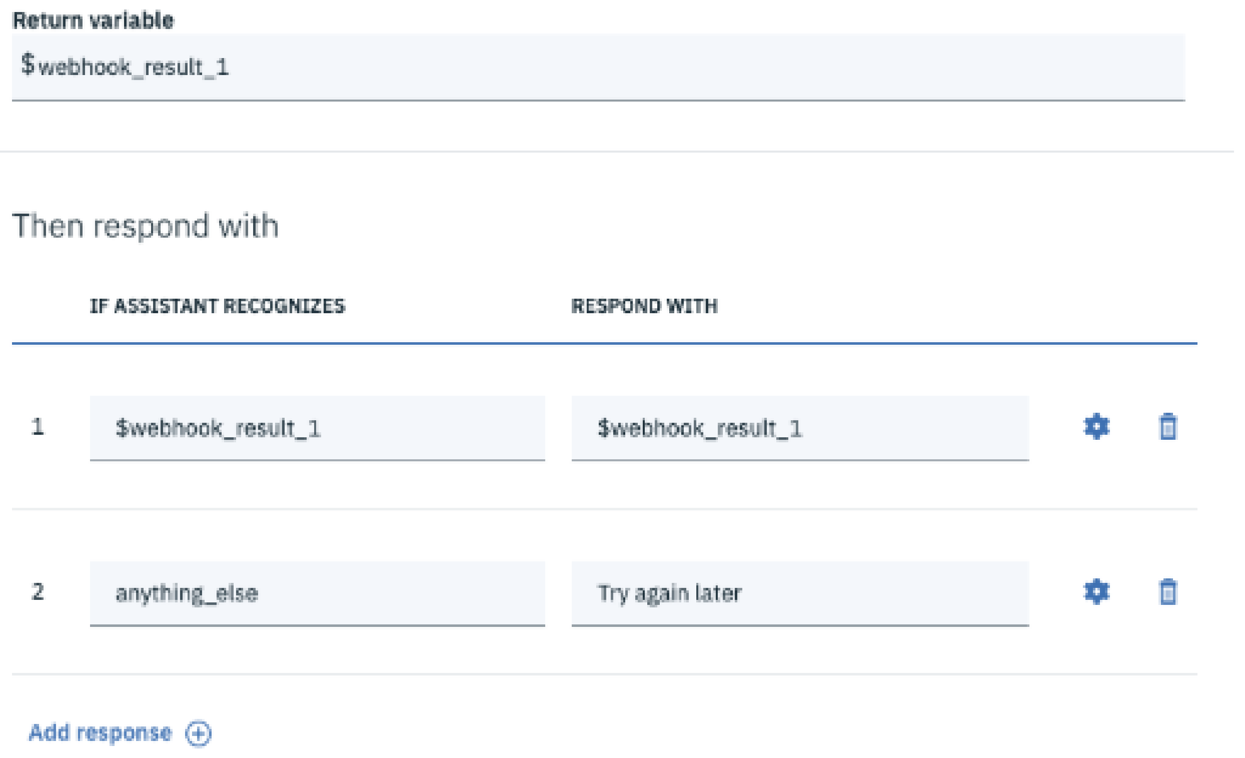
KEY	VALUE
input	"<?input.text?>"

Return variable: $webhook_result_1

IBM Watson Assistant
Cookie Preferences
Skills /
Try it
Save new version
Intents
Entities
Dialog
Analytics
Options
Versions
Content Catalog
#Customer_Care_Store_Hours
5 Responses / 0 Context Set / Returns
Directions and location
#Customer_Care_Store_Location
3 Responses / 0 Context Set / Skip user input / Returns
Make an appointment
#Customer_Care_Appointments
3 Responses / 7 Context Set / 5 Slots / Does not return
Transfer to agent
#General_Connect_to_Agent
1 Responses / 0 Context Set / Does not return
Small Talk
3 Dialog nodes / No digressions
Ask about product
#Product_Information
2 Responses / 0 Context Set / Does not return
anything_else
1 Responses / 0 Context Set / Returns
Customize
Learn more
Add parameter
2
1
Then respond with

You will also need to pass in the users question via the parameter input [2]. The key needs to
be set to the value: "<?input.text?>"

If you fail to do this, Discovery will return results based on a blank query. Optionally, you can add these responses to aid in debugging:



Return variable

$webhook_result_1

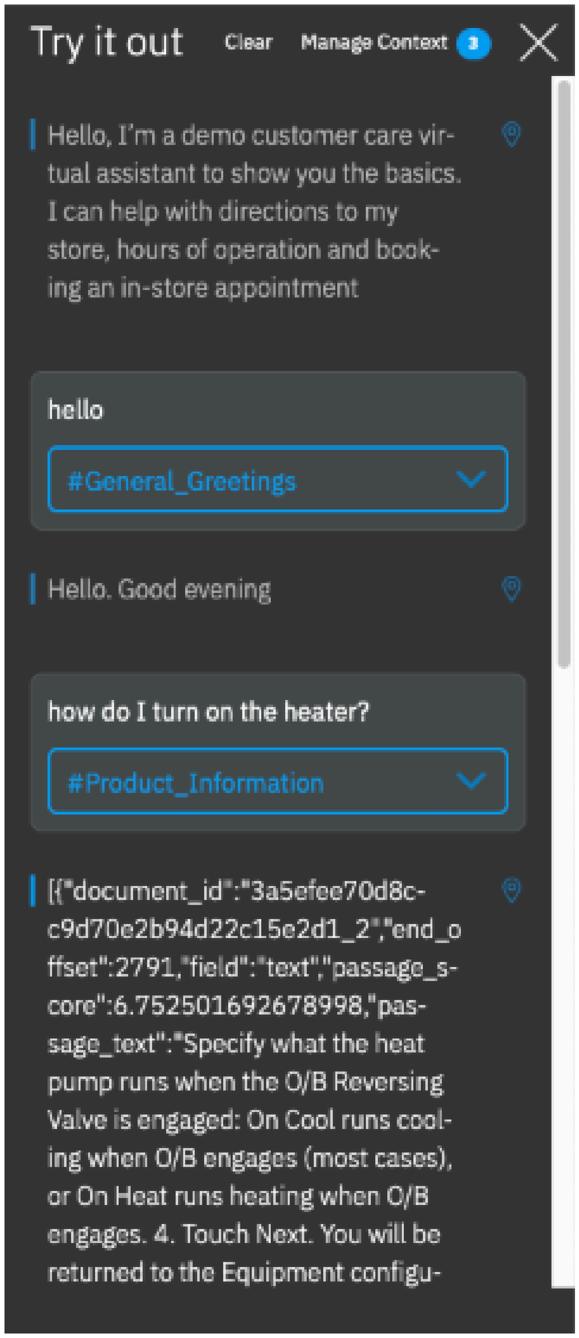
Then respond with

	IF ASSISTANT RECOGNIZES	RESPOND WITH
1	$webhook_result_1	$webhook_result_1
2	anything_else	Try again later

Test in Assistant Tooling

From the Dialog panel, click the Try it button located at the top right side of the panel.

Enter some user input:



Hello, I'm a demo customer care virtual assistant to show you the basics. I can help with directions to my store, hours of operation and booking an in-store appointment

hello

#General_Greetings

Hello. Good evening

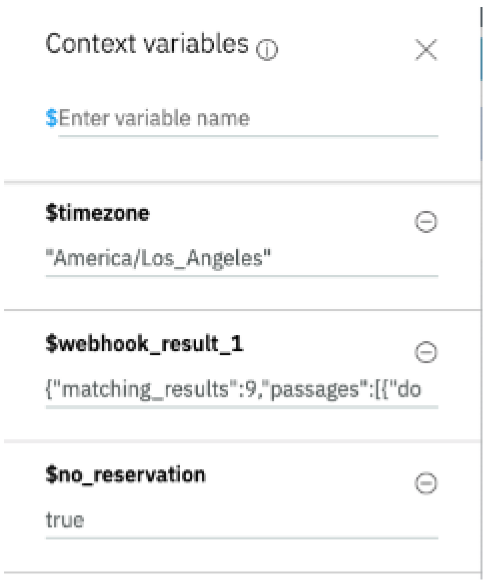
how do I turn on the heater?

#Product_Information

[{"document_id":"3a5efee70d8c-c9d70e2b94d22c15e2d1_2","end_offset":2791,"field":"text","passage_score":6.752501692678998,"passage_text":"Specify what the heat pump runs when the O/B Reversing Valve is engaged: On Cool runs cooling when O/B engages (most cases), or On Heat runs heating when O/B engages. 4. Touch Next. You will be returned to the Equipment configu-

Note that the input "how do I turn on the heater?" has triggered our Ask about product dialog node, which is indicated by the #Product_Information response.

And because we specified that $webhook_result_1.passages be the response, that value is displayed also.You can also verify that the call was successfully completed by clicking on the Manage Context button at the top right. The response from the Discovery query will be stored in the $webhook_result_1 variable:


Context variables

$Enter variable name

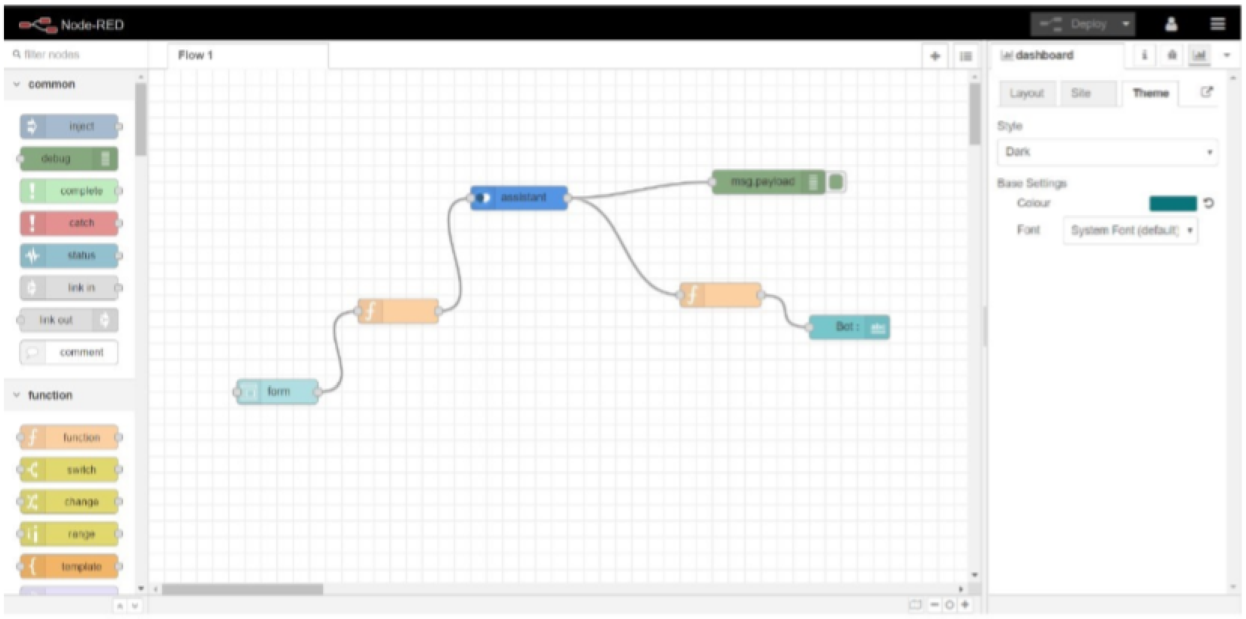
$timezone
"America/Los_Angeles"

$webhook_result_1
{"matching_results":9,"passages":[{"do

$no_reservation
true

Integration of watson assistant in Node-RED

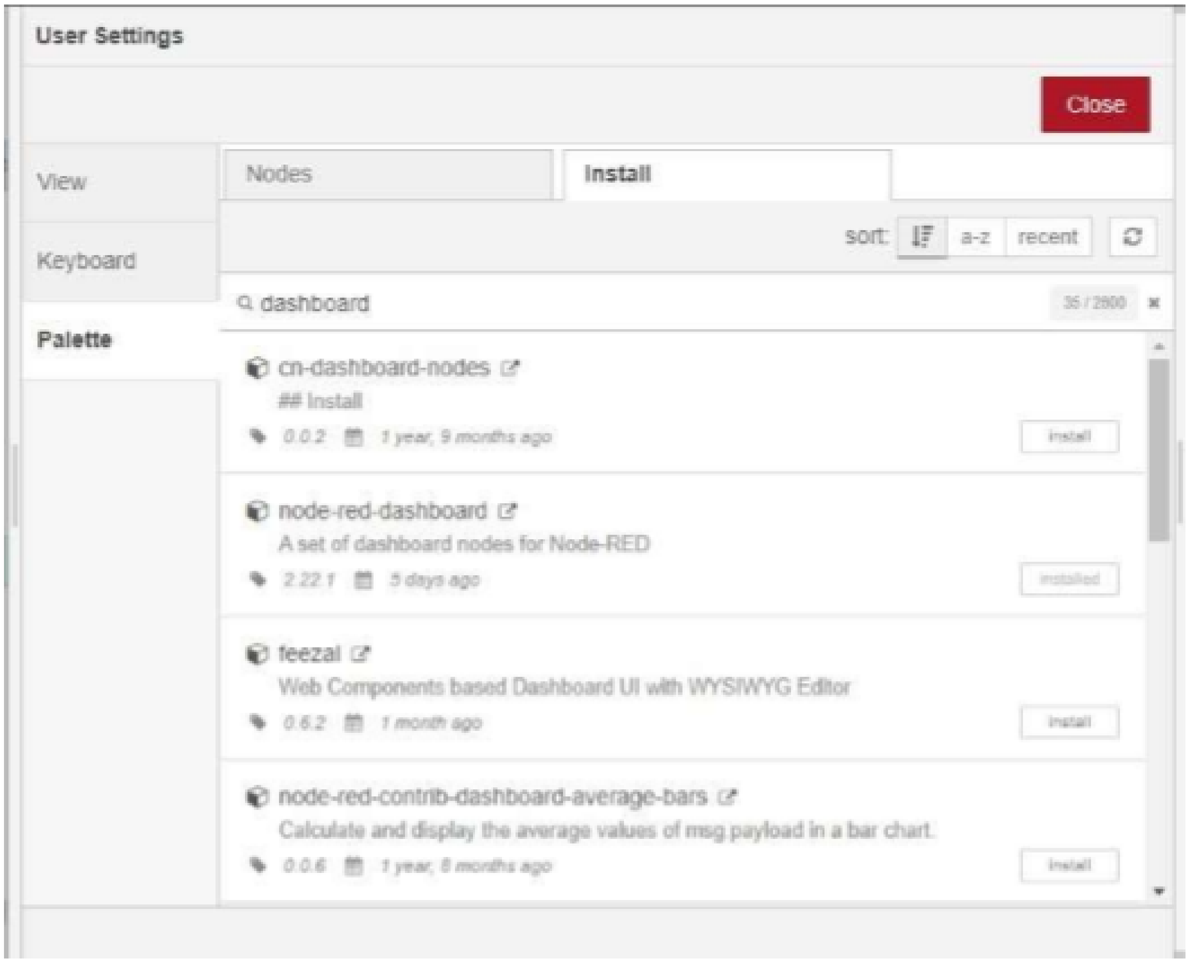
- Double-click on the Watson assistant node
- Give a name to your node and enter the username, password and workspace id of your Watson assistant service
- After entering all the information click on Done
- Drag inject node on to the flow from the Input section
- Drag Debug on to the flow from the output section
- Double-click on the inject node
- Select the payload as a string
- Enter a sample input to be sent to the assistant service and click on done
- Connect the nodes as shown below and click on Deploy



Next,

- Open Debug window as shown below
- Click on the button to send input text to the assistant node
- Observe the output from the assistant service node
- The Bot output is located inside “output.text"

- Drag the function node to parse the JSON data and get the bot response
- Double click on the function node and enter the JSON parsing code as shown below and click on done and Connect the nodes as shown below and click on Deploy.
- Re-inject the flow and observe the parsed output
- For creating a web application UI we need “dashboard“ nodes which should be installed manually.
- Go to navigation pane and click on manage palette



dashboard 35 / 2800

cn-dashboard-nodes
Install
0.0.2 1 year, 9 months ago install

node-red-dashboard
A set of dashboard nodes for Node-RED
2.22.1 5 days ago installed

feezal
Web Components based Dashboard UI with WYSIWYG Editor
0.6.2 1 month ago install

node-red-contrib-dashboard-average-bars
Calculate and display the average values of msg.payload in a bar chart.
0.0.6 1 year, 8 months ago install

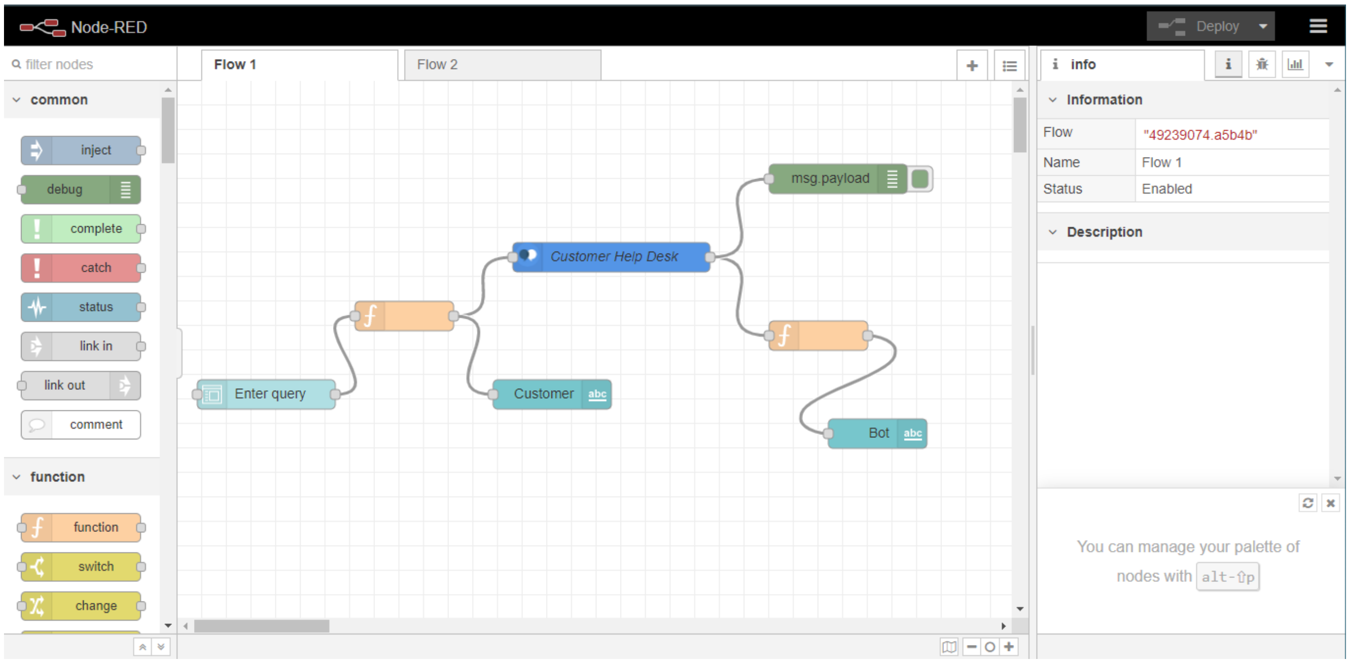
- Click on install
- Search for “node-red-dashboard” and click on install and again click on install on the prompt

- The following message indicates dashboard nodes are installed, close the manage palette
- Search for “Form” node and drag on to the flow
- Doube click on the “form” node to configure
- Click on the edit button to add the “Group” name and “Tab” name
- Click on the edit button to add tab name to web application
- Give sample tab name and click on add do the same thing for the group
- Give the label as “Enter your input”, Name as “text” and click on Done
- Drag a function node, double-click on it and enter the input parsing code.
- Click on done

Then,

- Connect the form output to the input of the function node and output of the function to input of assistant node   Search for “text” node from the “dashboard” section
- Drag two “text” nodes on to the flow
- Double click on the first text node, change the label as “You” and click on Done
- Double click on the second text node, change the label as “Bot” and click on Done
- Connect the output of “input parsing” function node to “ You” text node and output of “Parsing” function node to the input of “Bot” text node
- Click on Deploy

5. FLOWCHART



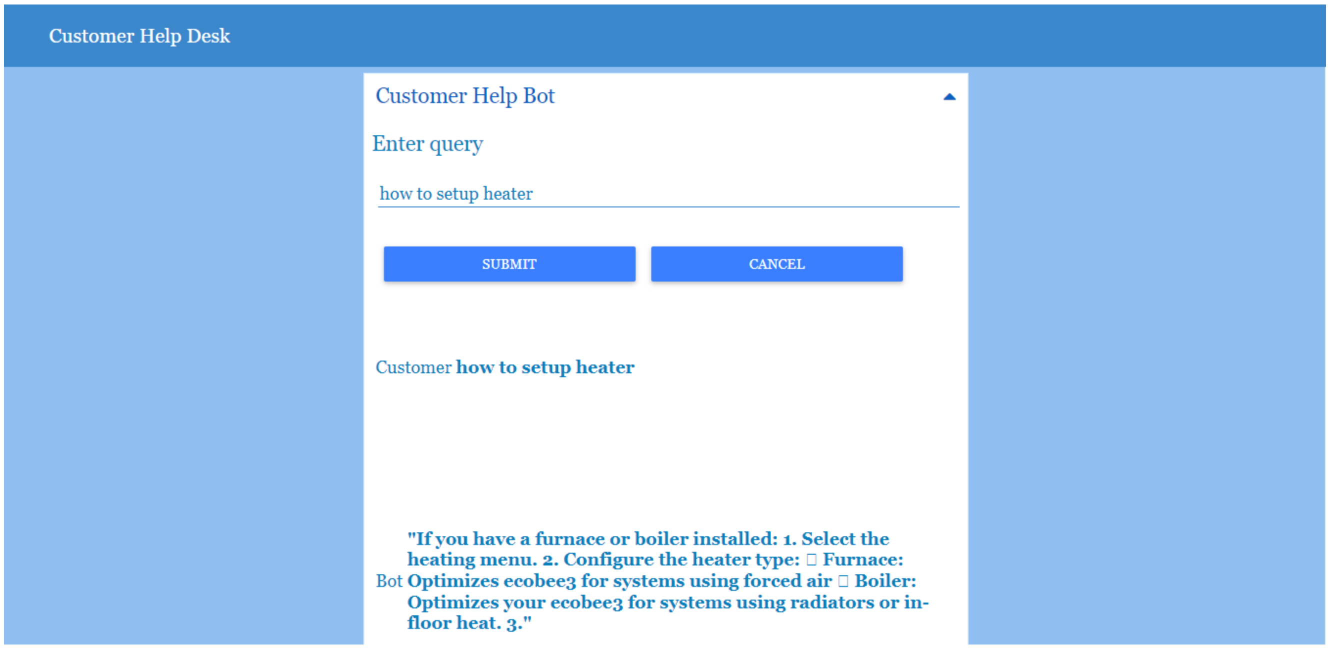
Flow	"49239074.a5b4b"
Name	Flow 1
Status	Enabled

You can manage your palette of nodes with `alt-⇧p`

6 . RESULT

Finally our Node-RED dash board integrates all the components and displayed in the Dashboard UI by typing URL-

https://node-red-prfyz.eu-gb.mybluemix.net/ui



how to setup heater

Customer **how to setup heater**

Bot **"If you have a furnace or boiler installed: 1. Select the heating menu. 2. Configure the heater type: Furnace: Optimizes ecobee3 for systems using forced air Boiler: Optimizes your ecobee3 for systems using radiators or in-floor heat. 3."**

7. ADVANTAGES AND DISADVANTAGES

Advantages

- ✔ Campanies can deploy chatbots to for easy and general human queries .
- ✔ Reduces man power.
- ✔ Cost efficient and easy to use.
- ✔ No need to divert calls to customer care agent for straightforward queries and customer care agent can do their other works .
- ✔ It can group similar reasonable queries of customer and we can make it learn from previous queries by training it in future.
- ✔ Less work load on employees because reduce the number of reps.

Disadvantages

- ✗ Sometimes the chatbot misleads the customers.
- ✗ The discovery returns wrong results when not properly configured.
- ✗ Giving same answer for different sentiments.
- ✗ Sometimes is unable to connect the customer sentiments and intents.
- ✗ If the chatbot doesn't understand the question it's helpless.
- ✗ Watson assistant takes time to understand large documents.

8 .APPLICATIONS

- ☞ This chatbot can be deployed as a standalone app which may no longer need a customer to manually visit the company’s website.

- ☞ It can deploy in popular social media applications like facebook,slack,telegram.

- ☞ Chatbot can deploy any website to clarify basic doubts of viewers.

9.CONCLUSION

By following the above-mentioned steps, we can create a chatbot which will help customers in answering the basic questions of the customer or user related to location of the office, working hours and the information about the product. We used Smart Document Understanding feature of Watson Discovery and we used a Node Red application to integrate all these services and created a UI dashboard for the customer to use the chatbot.

Hence we successfully created the intelligent customer helpdesk with smart document understand using Watson Assistant, Watson Cloud Function, Watson Discovery and Node-RED.

10. Future Scope

- ✓ In future the results of discovery can be improved by enriching it with more fields and doing the Smart Data Annotation more accurately.
- ✓ We can get the premium version to increase the scope of our chatbot in terms of the calls and requests.
- ✓ We can also include Watson text to audio and Speech to text services to access the chatbot handsfree.
- ✓ By making this chatbot more interactive and user friendly it can be made useful for any user .

11. BIBILOGRAPHY

APPENDIX

References:

[1] Create a Node-RED starter application
https://developer.ibm.com/components/node-red/tutorials/how-to-create-a-node-red-starter-application/

[2] Node-RED website
https://nodered.org/

[3] Getting started with Watson Assistant
https://developer.ibm.com/components/watson-assistant/series/learning-path-watson-assistant

[5] Watson Discovery documentation
https://cloud.ibm.com/docs/discovery?topic=discovery-getting-started

[6] IBM Cloud Functions documentation
https://cloud.ibm.com/docs/openwhisk?topic=openwhisk-getting-started

[7]Build a Node.js chatbot that uses Watson services and webhooks to query an owner's manual
https://github.com/IBM/watson-discovery-sdu-with-assistant

[8]Integration Of Watson Assistant To Node-Red
http://www.iotgyan.com/learning-resource/integration-of-watson-assistant-to-node-red

A.SOURCE CODE

IBM Cloud functions web action code :

```
/**
 *
 * @param {object} params
 * @param {string} params.iam_apikey
 * @param {string} params.url
 * @param {string} params.username
 * @param {string} params.password
 * @param {string} params.environment_id
 * @param {string} params.collection_id
 * @param {string} params.configuration_id
 * @param {string} params.input
 *
 * @return {object}
 *
 */

const assert = require('assert');
const DiscoveryV1 = require('watson-developer-cloud/discovery/v1');

/**
 *
 * main() will be run when you invoke this action
 *
 * @param Cloud Functions actions accept a single parameter, which must be a JSON
object.
 *
 * @return The output of this action, which must be a JSON object.
 *
 */
function main(params) {
 return new Promise(function (resolve, reject) {

   let discovery;
```

```
    if (params.iam_apikey){
      discovery = new DiscoveryV1({
        'iam_apikey': params.iam_apikey,
        'url': params.url,
        'version': '2019-03-25'
      });
    }
    else {
      discovery = new DiscoveryV1({
        'username': params.username,
        'password': params.password,
        'url': params.url,
        'version': '2019-03-25'
      });
    }

    discovery.query({
      'environment_id': params.environment_id,
      'collection_id': params.collection_id,
      'natural_language_query': params.input,
      'passages': true,
      'count': 3,
      'passages_count': 3
    }, function(err, data) {
      if (err) {
        return reject(err);
      }
      return resolve(data);
    });
  });
}
```